

numerous and important and cover a wide range of subjects, chiefly on the border-land of physics and chemistry. His main work, and that with which his name will be always associated, is unquestionably his exhaustive and protracted series of researches on the relationship between the refractivity and the chemical constitution of organic compounds. Following the pioneering work of Gladstone and Dale in this country, Brühl made this subject for many years essentially his own, and he has always been regarded as the leader and chief authority in this branch of physical chemistry. It will be remembered that he was the first to bring optical evidence to bear upon the question of the constitution of the benzene "ring."

Brühl first made his mark in 1880 in that department of physical chemistry in which he laboured with such conspicuous success throughout the latter part of his life. His predecessors in this field had prepared the way by showing that some relationship existed between refractivity and chemical composition, but real progress only began to be made when, by his researches, he showed that the mode of linkage of the atoms, i.e. the chemical constitution, was all important in determining this physical property of the chemical molecule. Following up the fruitful line of work thus opened out, he showed further, that not only could the degree of unsaturation of an organic compound be determined by the refractivity method, but that the apparent anomalies between observed and calculated results were referable to the relative positions of the unsaturated groups, and so he invested the method with increased powers as a means of attacking the all-important problem of chemical constitution. Not the least important application of his method, and one which he himself developed towards the end of his career, is the determination by the optical method of the constitution of tautomeric compounds in solution—a problem which eludes ordinary chemical methods. It was this and other developments of his labours which brought him into contact with the researches of the late Sir William Perkin, with whom he was in constant communication and who had the greatest admiration for his work. Perkin was, in fact, attacking this and analogous problems by his method of magnetic rotation, and the influence of the two pioneers upon each other's results is acknowledged in their scientific publications.

A few years ago Brühl underwent a serious operation which crippled his activity and from the effects of which he never completely recovered. By his death science suffers a heavy loss, and this country is deprived of a warm friend, for the Heidelberg professor's Anglophile sentiments are well known. He was a familiar figure here, and highly esteemed by all who had the privilege of his friendship. His knowledge of our language, and of English literature generally, was both wide and deep, and his chief recreation was the reading of the works of English poets and novelists. Many letters by Brühl addressed to the present writer are distinctly high-class literary productions, which would put to shame many of our university graduates. It will be remembered that he was responsible for the German edition of the organic portion of Roscoe and Schorlemmer's treatise. He gave a Friday evening discourse on his own subject at the Royal Institution in May, 1905. He was an honorary member of that Institution, and the University of Cambridge bestowed upon him the honorary degree of Sc.D. during one of his visits to this country. The life-work of Brühl furnishes another illustration of the principle, so generally ignored here, that practical applications follow the development of pure science pursued for its own sake. Out of a series of researches prompted by

no immediate practical requirements, but carried out solely with the object of ascertaining how far a particular physical property could be made available for the solution of some of the most abstract of chemical problems, there has arisen a method of the greatest practical utility to manufacturers for the determination of the purity or the value of many products used in chemical industry. Thanks to Brühl the "refractometer" has become a recognised laboratory instrument for technical as well as for scientific purposes.

R. M.

NOTES.

THE second reading of the Government Bill for the adoption of Greenwich time as the official time in France was adopted by the French Senate on February 10. In the discussion of an amendment to the measure, reference was made to the Daylight Saving Bill, and it was suggested that the question of introducing Greenwich time into France ought to be deferred until it was known whether our House of Commons would adopt the seasonal change of time-standard proposed in that Bill. The amendment was, however, rejected by 213 votes to 73, and the Bill passed into law, to take effect after the President's signature. France will thus be brought into the international or zone system of time-reckoning, and its official time will differ from other standard times in the system by a definite number of hours. The time of the Paris meridian will, however, be retained for naval purposes.

By the instructions of the London County Council, a blue tablet of encaustic ware has been affixed to No. 32 Soho Square, W., at one time the residence of Sir Joseph Banks, who was elected president of the Royal Society in 1778, and held that office for forty-one years.

THE Helmholtz medal of the Berlin Academy of Sciences has, says the *Revue scientifique*, been awarded to Prof. van 't Hoff.

THE annual conversazione of the Institution of Civil Engineers will be held on Thursday, June 29, in the Royal Albert Hall.

THE next meeting of the Institute of Metals will be the second May lecture, which is to be delivered in London on Friday, May 12, by Dr. G. T. Beilby, F.R.S., on "The Hard and Soft States in Metals." The autumn meeting of the institute will be held this year at Newcastle-on-Tyne on Wednesday and Thursday, September 20 and 21.

DR. C. R. BEAZLEY, professor of history, University of Birmingham, has been elected a corresponding fellow of the Academy of Sciences of Lisbon, in recognition of his work on mediæval history, and especially on the explorations of the Portuguese.

THE gold medal of the Institution of Mining and Metallurgy has been awarded to Sir Julius Wernher, in recognition of his great personal services in the advancement of technological education and in the promotion of the highest interests of the mining and metallurgical professions.

THE *British Medical Journal* states that, in response to the request of the Chinese Government for an international commission to proceed to China at an early date to investigate the present outbreak of plague in Manchuria, and to devise means for the prevention of its further spread, the British Government has instructed Dr. Reginald Farrar, one of the medical inspectors of the Local Government Board, to proceed to China at an early date.

SIX Hunterian lectures on "The Fossil Remains of Man and their bearing on the Origin of Modern British Types" are to be delivered in the theatre of the Royal College of Surgeons, Lincoln's Inn Fields, by Prof. Arthur Keith, at 5 p.m. on Mondays, Wednesdays, and Fridays in the fortnight beginning on February 20. The lectures are designed to serve as an introduction to the study of the anthropological collection in the museum of the college.

THE Lannelongue prize, founded last year by Prof. Lannelongue, of Paris, has been presented to Sir Victor Horsley, F.R.S. The prize is a gold medal and the sum of 200*l.*, and it is awarded to the person who had contributed most to the progress of surgery in the ten years before the date of the award. It is open to surgeons of all nations, and is to be awarded every five years during the annual meeting of the Société de Chirurgie.

At the anniversary meeting of the Malacological Society of London on Friday, February 10, held (by permission) at the Linnean Society's rooms, the following officers and council were elected for the ensuing year:—*President*, Mr. R. Bullen Newton; *vice-presidents*, Rev. R. Ashington Bullen, Mr. G. C. Crick, Prof. H. M. Gwatkin, Mr. B. B. Woodward; *treasurer*, Mr. J. H. Ponsonby; *secretary*, Mr. G. K. Gude; *editor*, Mr. E. A. Smith; *other members of the council*, Mr. S. Pace, Mr. H. B. Preston, Dr. W. G. Ridewood, Mr. H. O. N. Shaw, Mr. E. R. Sykes, and Mr. J. R. le B. Tomlin. The president delivered an address entitled "A Sketch of the Chief Geological Zones and their Mollusca."

THE current number of the *Revue scientifique* announces the election of the officers for the present year of several French scientific societies. In the case of the Physical Society, Prof. L. Poincaré is the president, M. B. Baillaud vice-president, M. H. Abraham general secretary, and Prof. Jean Becquerel secretary. Prof. Béhal has been elected president of the Chemical Society. M. Léon Teisserenc de Bort becomes president of the Meteorological Society, MM. Lemoine and Maillet vice-presidents, M. Goutereau general secretary, and M. Besson secretary.

THE *Kainan Maru*, with the members of the Japanese Antarctic Expedition on board, left Wellington, New Zealand, on February 11 for the Antarctic. It is stated that the only chart of the far south possessed by the expedition is a reduced copy of Sir Ernest Shackleton's map, and that the only means of transport on land consist of very light sledges and twelve dogs. A Press message from Hamburg states that the German South Polar Expedition will start from there on May 2. The expenses of the expedition, estimated at 68,000*l.*, have been partially guaranteed by Hamburg charterers.

At the anniversary meeting of the Royal Astronomical Society on February 10, the following officers and council were elected:—*President*, Prof. F. W. Dyson, F.R.S.; *vice-presidents*, Sir W. de W. Abney, K.C.B., F.R.S., Mr. E. B. Knobel, Dr. W. H. Maw, Prof. H. H. Turner, F.R.S.; *treasurer*, Major E. H. Hills, C.M.G.; *secretaries*, Mr. A. R. Hinks, Mr. S. A. Saunder; *foreign secretary*, Sir David Gill, K.C.B., F.R.S.; *council*, Sir W. H. M. Christie, K.C.B., F.R.S., Dr. P. H. Cowell, F.R.S., Dr. A. C. D. Crommelin, Mr. A. S. Eddington, Prof. A. Fowler, F.R.S., Dr. J. W. L. Glaisher, F.R.S., Prof. E. W. Hobson, F.R.S., Mr. H. P. Hollis, Mr. Thomas Lewis, Prof. H. F. Newall, F.R.S., Rev. T. E. R. Phillips, and Mr. F. J. M. Stratton.

At a meeting of the Institution of Civil Engineers on January 24, the influence of ocean currents along a coastline on the movement of sand was discussed by Mr. G. H.

Hallgar in describing the conditions on the coast of New South Wales. A permanent southerly ocean current having a velocity of about 1 to 1½ knots per hour inshore causes a sand movement in the direction of its flow which the heaviest seas or gales only temporarily disturb. Observations showed that even the most violent gales from the south only reverse the current during their continuance, while the more frequent northerly winds increase its velocity. The run-off of the rivers is not sufficient to scour out the river-mouths except in heavy flood, and stress is laid on the necessity for so designing harbour entrances that the velocity of the flood-tide entering it may be less than that of the littoral current, in order that the sand in suspension may be carried past the entrance instead of entering the estuary at each tide.

ON February 8 a portrait of Prof. W. Boyd Dawkins, F.R.S., by Mr. W. Llewellyn, was presented to the Whitworth Hall of the University of Manchester by a large number of friends and admirers who wished to show their appreciation of his long and distinguished services to the University, the Manchester Museum, and the City of Manchester generally. The portrait was unveiled by Prof. S. J. Hickson, F.R.S., dean of the faculty of science in the University, and was received on behalf of the University council by Sir Frank Forbes Adam, C.I.E., and the Vice-Chancellor, Sir Alfred Hopkinson. In unveiling the portrait, Prof. Hickson directed attention to the fact that largely through Prof. Dawkins's energy and enthusiasm the present museum has been transformed from the condition of an unclassified local collection of curiosities to be an important reference museum, meeting the wants of students and teachers, the general intellectual public, as well as those workers in science who have to rely on trustworthy material for reference. He also reviewed Prof. Dawkins's contribution to the early history of man, and the vertebrate palæontology of the Tertiary and post-Tertiary ages, as well as his activity in the problems of applied geology. Although Prof. Dawkins has now retired from the chair of geology, he still shares the work of the University as an honorary professor and as a museum lecturer and member of the committee, and thus his retirement from university work is more formal than real.

"THE Academic Aspect of the Science of National Eugenics" (Eugenics Laboratory, Lecture Series, vii. London: Dulau and Co., Ltd., 1911) is the title of a lecture delivered to undergraduates by Prof. Karl Pearson. Its main purport is to emphasise the need for the study of social questions in the same manner that scientific questions are studied. To quote the words of the lecturer:—"You cannot settle such essential problems of society as alcoholism, tuberculosis, mental defectiveness, or the changing status of women, by oratory in the marketplace. I claim that these things must be studied in university laboratories, where Oxford shall check the results of Cambridge, and London correct both of them, if need be."

A LIST of publications of the Bureau of American Ethnology, with index to authors and titles, has been published by the Smithsonian Institution at Washington. These publications consist of contributions to North American ethnology, annual reports, bulletins, introductions, and miscellaneous publications. The issue of annual reports began in 1880, and the present maximum edition of an annual report is 9850 copies. With the exception of a few copies of the publications of the Bureau disposed of by the U.S. Superintendent of Documents, the editions are distributed free of charge.

IN *Man* for January, Mr. H. S. Cowper describes the exploration of a flint implement factory on a site at Hilwan, Lower Egypt, previously examined by Mr. A. J. Jukes Brown, who contributed papers on the subject to the *Journals of the Cambridge Antiquarian Society* and the *Anthropological Institute* in 1877. He discusses the theories that this type of implement may have been used for arming the edges of serrated weapons or for fishing, and, deciding in favour of the latter supposition, suggests that the sites where implements of this type are found should be studied in relation to the fishing industry. He asserts that they have no connection with the Neolithic implements found in such large numbers in recent years in various parts of the desert of Lower Egypt.

THE habits of the common American mole, *Scalops*, or *Scalopus aquaticus*, are discussed in two papers, respectively by Mr. F. E. Wood and Mr. J. A. West, published in vol. ix., of the *Bulletin of the Illinois State Laboratory of Natural History*. This mole, which—despite its name—is not aquatic, undoubtedly does much damage to newly sown cornfields by burrowing along the lines of the drills. From such tunnelled rows the seed is often found to have more or less completely disappeared, and farmers charge the mole with being the culprit. The accusation is proved by Mr. West to be true, the stomachs of many of the moles examined by him containing corn in various proportions to the rest of the food. For the greater part of the year, however, these moles feed on worms and insects.

"THE Sudden Origin of New Types" is the title of an article communicated by Dr. F. Oswald to the January number of *Science Progress*. After adducing evidence in support of this theory from plants, the author observes that the sudden rise and predominance of mammals in the Tertiary must be due to rapid development of some part of their organisation, and that this part was the mammary glands. These glands, it is suggested, may have been derived from the lateral-line system of amphibians, since both are developed in the Malpighian layer of the skin. Having stated that such a derivation is "within the range of probability," Mr. Oswald proceeds to regard it as a demonstrated fact, and to argue that, "as a necessary corollary to the absence of the lateral line in all reptiles, it is evident that—contrary to the received and general opinion—the mammals must have taken their origin directly from Amphibia, not from anomodont reptiles." Then follows a review of apparent instances of the sudden rise of certain groups (such as graptolites) or certain organs among invertebrates, special stress being laid on a suggested origin of tracheæ from the gills of a hypothetical fresh-water trilobite by the transformation of the latter into lung-books sunk in the body and communicating with the exterior by means of stigmata.

MUCH interest attaches to the description by Prof. H. F. Osborn, in the January number of the *American Museum Journal*, of a "mummy" of the iguanodont dinosaur from the Kansas Cretaceous, known as *Trachodon annectans*. The specimen includes, not only the greater part of the skeleton, but likewise a large portion of the epidermis, which "is shrunken around the limbs, tightly drawn along the bony surfaces, and contracted like a great curtain below the chest-area." In the opinion of its describer, the reptile, after dying a natural death, lay for a time on a river-bank, without being molested by birds or crocodiles, until it became thoroughly desiccated, after which it was carried down by a flood, and buried in sediment of a character suited to retain a cast of the surface sculpture.

The skin was covered with tubercles, varying in size on different parts of the body. The tenuity of the epidermis favours the theory, according to Dr. Osborn, that these reptiles "spent a large part of their time in the water, which theory is strengthened by the fact that the diminutive fore-limb terminates, not in claws or hoofs, but in a broad extension of the skin, reaching between the fingers and forming a kind of paddle. This marginal web, which connects all the fingers with each other, together with the fact that the lower side of the fore-limb is as delicate in its epidermal structure as the upper, tends to support the theory of the swimming rather than the walking or terrestrial function of this fore-paddle." The article is illustrated with pictures, not only of the "mummy" skin, and skeleton, but likewise of the restored animal, the length of which was about 30 and its height between 15 and 16 feet.

ACCORDING to the report on the Botanic Station Experimental Plots and Agricultural Education, Antigua, 1909-10, there are indications that the cotton industry may regain some of its late importance. Experiments are reported on the flower-bud maggot and the leaf-blister mite; hybridisation work has also been begun. The production of cocoanuts and limes is increasing, and becoming an important industry; onions are also being more and more grown. Experiments are reported on broom corn and other crops likely to be useful. The report on the Botanic Station, St. Kitts-Nevis, shows that the sugar-cane season has been successful; early planted cotton also did well, and planters are learning to control the pests; there also seems the prospect that cacao and rubber may be successfully grown. Experiments are recorded on yams, sweet potatoes, and onions. The Montserrat report shows useful work is being done in connection with cotton selection and the cultivation of limes. Other lines of investigation deal with the improvement of ground nuts and Indian corn by selection, and the determination of the best varieties of certain provision crops.

AN investigation into the effect of coloured light on the development of pure cultures of the green alga *Stichococcus bacillaris* is described by Prof. G. A. Nadson in the *Bulletin du Jardin Impérial Botanique*, St. Petersburg (vol. x., part v.). The cultures raised in reddish-yellow light showed weak growth and colour; those in bluish light showed at first rather weaker development, but eventually the filaments assumed a purer green colour than those in white light, and the improvement was maintained through successive generations grown in blue light. The same author, with Mr. S. M. Adamovic, describes the experiment of adding to a culture solution for *Bacillus mycoides* a proportion of the products of catabolism taken from a previous culture of the organism. This produced a marked change in the *Bacillus*, inhibiting its powers of liquefying gelatin and producing spores, and causing it to form special membranes round its cells.

THE International Association of Tropical Agriculture and Colonial Development has issued, in pamphlet form, the report on the present position of cotton cultivation, which was presented to the congress in Brussels in 1910 by Dr. Wyndham R. Dunstan, F.R.S. The reports which Dr. Dunstan has brought together, as reporter-general to the congress on cotton cultivation, relate to all those countries in which cotton cultivation is an established and important industry, and also to those in which cotton cultivation is still in an experimental stage. The writers of the reports were requested to pay special attention to the present position and prospects of the industry, any

special difficulties met with, and the nature of the experimental work in progress. Summaries of all these reports are given here, and Dr. Dunstan discusses generally the more important questions involved, and considers the problems of cotton production as a whole. Copies of the publication can be obtained from the Imperial Institute at 1s. each, or 1s. 1½d. post free.

THE Colonial Annual Report, No. 644, deals with survey work accomplished in British Africa, Ceylon, Cyprus, Fiji, Jamaica, Trinidad, and British Honduras during the year ending March 31, 1910. It is essentially a progress report, and the methods of work employed in the different Crown colonies are therefore not described, and no comparison of them is possible. In several areas triangulation, topographical detailed surveying, and cadastral surveying are in hand, and the last-named is often urgently needed for the settlement of native owners and the allotments of Government lands. The long list of directors and inspectors of survey already engaged on this important work, which is presented at the end of the report, would seem to indicate that the study of advanced surveying may be worth the attention of physical and mathematical students.

METEOROLOGICAL material is rapidly accumulating in Africa, and a valuable contribution is published in the *Mitteilungen der deutschen Schutzgebieten* (Heft 5, Band 23). Tables of the rainfall recorded at fifty-one stations in the Cameroons during 1909 are given detailing the total and maximum in twenty-four hours for each month, as well as the distribution of rainy days. On the whole, the rainfall in the north and south of the colony was not markedly greater than in the previous year, but at a group of stations in the central portion, especially in the Cameroon mountains, the rainfall of 1909 was considerably greater. From the eastern coast of Africa we have the whole of the meteorological observations taken at forty-seven stations in 1907 and 1908 throughout German East Africa from the coast so far inland as Lake Tanganyika.

An interesting question of geological nomenclature is raised by Prof. J. W. Gregory, F.R.S., in an article in the *Geographical Journal* for February. The terms "denudation," "erosion," "corrosion," and "corrasion" are dealt with, and after an examination and discussion of the uses of these terms by various geological writers, Prof. Gregory makes several suggestions. He thinks it would be convenient, with a view particularly to secure uniformity in Europe and America, to use the terms as follows:—denudation for the wearing down of the land by any agency; erosion for the widespread lowering of the land by wind, rain, and weather, and by rivers and glaciers acting laterally; corrosion for the excavation by rivers and glaciers of their beds; corrasion dismiss as a synonym of corrosion; abrasion for the attack of the sea on the land, though when used in this restricted sense it is well to refer to the process as marine abrasion; solution for the action of solvents.

ON February 13 Major P. H. Fawcett, R.A., lectured before the Royal Geographical Society on the exploration which had to be undertaken in Bolivia before the delimitation of the new frontier between that country and Peru could be carried out. Situated in the extreme north-west of Bolivia, and watered by the Madre de Dios and its tributaries, this plain at the foot of the eastern slopes of the Andes is largely covered by dense forest, and the natives have always been intensely hostile to all parties who have attempted the exploration of this region. The Heath river, previously hardly known, was ascended in

canoes, and by gaining the friendship of the natives much assistance was gained. These Guarayos use the milky juice of the "manuna" or "soliman" tree, which is perhaps to be identified with *Hura crepitans*, to capture fish in the lagoons of the forest; it is poured into the water, and every fish coming in contact with it is rendered incapable of movement, though still alive, and in no way impaired as food. Exploration being the object of the expedition, little time could be given to scientific observation, and the weather rendered all astronomical observations for the determination of position impossible. Gold is stated to occur in many parts of the foothills, and copper, antimony, galena, and silver to exist abundantly in a region which is still largely inaccessible.

MR. N. A. KOROSTELEF has collected meteorological observations recorded by various expeditions to Novaia Zemlia, among which those from Malyia Karmakuly extend over sixteen years (Bulletin of the Imperial Academy of Sciences of St. Petersburg, No. 11, 1910). The climate is exceedingly cold and damp, the sky is generally overcast, and exceedingly strong winds are frequent, accompanied by only slight precipitation. The variability of the weather and of the monthly means of the meteorological readings is very marked. The temperature of March was 19.4° F. in 1907 and -18° F. in 1902. Again, the mean for the winter half of the year (November–April) was 18° F. in 1906–7 and -4° in 1901–2. Cyclones following one another, with occasionally more permanent anticyclones, account for the variability of the climate. The highest temperatures during the whole period of observation occurred in all the months of the year, that is, a thaw is possible in any month. On the other hand, there was no month without frost; once the thermometer fell in July to 14° F.; 1898 was remarkable for the range of pressure, when the barometer in the short interval from February 8 to March 16 passed from the absolute minimum of the whole period of observation, 28.31 inches, to the absolute maximum, 31.22 inches. There is great humidity in the air in all months, the average being 84 per cent., or 5 per cent. higher than in St. Petersburg. The cloudiness is, on an average, three-fourths, declining to nought in winter and rising so much the higher in summer. The number of days in the year with precipitation was 181; in October the average number was twenty, and in one year there was in March only one day without precipitation. The prevailing winds are south-east and east; only in June do they blow chiefly from the north and north-west. The winds are very high, and the greatest velocity recorded was 131 feet a second. Not infrequently, however, the anemometer was unable to withstand the force of the wind.

A RECENT contribution of Mr. Alfred W. G. Wilson to *Economic Geology* (vol. v., No. 7) gives a descriptive account of the organisation and work of the Department of Mines of Canada. The department dates from 1907, while the Geological Survey of Canada, the forerunner of the present department, was first constituted in 1842. The paper provides interesting particulars as to the development and growth of the work of the department. In past years the funds voted by Parliament for the service of what is now the Department of Mines have usually been little more than 20,000l. It is only within the last few years that there has been any notable increase; for 1909–10 the total amount available was 101,000l., being slightly more than one half of 1 per cent. of the annual value of the industry for the same year. For the fiscal year 1910–11 the total vote at the service of the department for all purposes is about 124,000l., which includes

a special grant for the investigation of processes for producing zinc. In this connection, attention may be directed to an advance chapter of the annual report on the mineral production of Canada during 1909, which has been received from the department, dealing with structural materials and clay products. The chapter is by Mr. J. McLeish, chief of the division of mineral resources and statistics. The subjects considered are cement, clay products, lime, sand-lime brick, sands and gravels, slate and stone for building. It appears that 1909 was one of record activity in the building trades. The value of cement sales in 1909 showed an increase of 44 per cent. over 1908, clay products 43 per cent., and lime 58.8 per cent. The total value of the increase in production amounted to well over a million pounds sterling.

THE Bryn Mawr College Monographs continue to show the activity of the institution in scientific research. Vol. viii. of the reprint series contains sixteen mathematical and two physical papers. Miss C. A. Scott contributes an elegant note on the construction of certain regular polygons with the help of an auxiliary hyperbola; and among the numerous papers by Mr. J. E. Wright, those on differential invariants may be mentioned as specially interesting. The physical papers (both by ladies) are on the spectra of sulphur dioxide and on the electric spark in a magnetic field.

In his presidential address to Section A of the South African Association for the Advancement of Science, delivered on November 2, 1910, Prof. J. C. Beattie gives an historical account of the growth of our knowledge of terrestrial magnetism, dealing more especially with the magnetic elements in Africa. Prof. Beattie regards the establishment of one or more fixed magnetic observatories in South Africa as an object of great scientific importance, and in this he undoubtedly has the support of all the leading magneticians of Europe. An appendix deals with terrestrial lines of declination, dip, and horizontal intensity for South Africa, based on the recent survey by Profs. Beattie and Morrison, and contains a chart for each of the three elements.

THE December (1910) number of *Terrestrial Magnetism and Atmospheric Electricity* contains a report of the Berlin meeting of the Commission on Terrestrial Magnetism and Atmospheric Electricity, and a useful reprint of the whole of the resolutions passed by the commission since the Munich meeting in 1891. Many of these refer to the steps to be taken to facilitate the comparison of the results obtained at different observatories. For this purpose, it is desired that the curves of variation of declination be reproduced to the scale of 1 minute of arc to 1 millimetre, those of horizontal and vertical intensities to the scale of 0.00005 C.G.S. unit to 1 millimetre, and that for disturbances the time scale be 1 hour to 15 millimetres. The importance of regular and frequent comparisons of the instruments used at the various observatories is insisted on. So far, nothing appears to have been done to carry out the suggestion of the commission that magnetic observatories be established along the magnetic meridian passing through the centre of Africa.

SEPARATE copies have been received of two communications made by Dr. F. Jentzsch, of Wetzlar, to the meeting of the German Naturforscher und Ärzte at Königsberg in September last, which have appeared in the *Verhandlungen der Deutschen Physikalischen Gesellschaft*. They deal with appliances designed by the author for improving the ultramicroscope. It will be remembered that in the ultramicroscope as used hitherto the light has

impinged on one side only of the object. Dr. Jentzsch's concentric condenser and ultracondenser receive the light along the axis of the microscope. It is reflected by a surface underneath the object, and, after further reflection, crosses the axis at right angles at the point at which the object is placed. An intense beam of light is thus produced, and the arrangement has the advantage that it can be fitted to an ordinary microscope.

ACCORDING to a circular issued by the Bureau of Standards at Washington in December, 1910, the Bureau on January 1 adopted the value 1.0183 international volts for the electromotive force of the Weston normal cell at 20° C. This is equivalent to an increase of 0.08 per cent. in the value of the international volt as used by the Bureau. The above value has been arrived at by an international investigation carried out at the Bureau of Standards by representatives of the Bureau, the National Physical Laboratory, the Reichsanstalt, and the Laboratoire Central, and is to be adopted by all these institutions so soon as the various Governments pass the necessary legislation (see p. 508). The international ohm, our readers will remember, is the resistance of a mercury column at 0° C., 106.3 centimetres long, of uniform cross-section, and of mass 14.4521 grams, and the international ampere deposits 0.001118 gram of silver per second.

In a paper read at the February evening meeting of the Pharmaceutical Society, Dr. W. H. Martindale suggested that rounded-off atomic weights should be adopted in the new "Pharmacopœia." The atomic weights of elements employed in the pharmacopœias of different nations show considerable variation in magnitude, especially with regard to the first, second, and third place of decimals. The figures for such important elements as arsenic, bismuth, bromine, chlorine, iodine, lithium, silver, and sodium vary particularly, and the variations are not accounted for by the fact that the oxygen standard is adopted by some and the hydrogen standard by others. Dr. Martindale's opinion is that, with the exception of the weights for chlorine, copper, and strontium, it might be better to do away with the decimal proportions altogether, and that a rounded-off series of figures like those in the French "Pharmacopœia" would be sufficiently accurate for pharmaceutical purposes. If rounded-off international standards could be arranged, so much the better.

THE Journal of the Chemical Society for January contains the reply of Prof. Komppa, of Helsingfors, to the criticisms of Messrs. Leblanc and J. F. Thorpe on his synthesis of camphoric acid. The critical point in the synthesis depends upon the point of attachment of the last methyl-group introduced into the molecule, which Komppa regards as attached to carbon (as in camphoric acid), whilst Leblanc and Thorpe have urged that its ready removal by alkalis proves it to be attached to oxygen. The original proof that the methyl-group was attached to carbon was based very largely on the fact that camphoric acid was actually prepared from the methylated compound, but it is now shown, further, (1) that the ester contains the group —CO—CO— , because it forms a colouring matter with *o*-phenylene diamine, resembling in this respect the whole series of ortho-quinones, but contrasting sharply with an isomeric ester in which the grouping is changed in the manner suggested by Leblanc and Thorpe to $\text{—CO—C(OCH}_3\text{)=}$, and (2) that the Zeisel method of analysis indicates the presence of only two —OCH_3 groups in the ester, although the isomeric ester actually gives the three —OCH_3 groups postulated by Leblanc and Thorpe. So much interest has attached to this synthesis, as settling

beyond all question the structural formula of camphor, that the confirmation now given of the validity of the synthesis is of considerable value and importance.

AN article on petrol-engine ratings appears in *Engineering* for February 10. It has never been altogether clear why so much ingenuity has been expended in the invention of formulæ which will give the horse-power of a petrol engine in terms of its physical dimensions, especially as most builders of such engines are quite prepared to state the actual brake-horse-power which has been given by any of their engines. In 1906 the Royal Automobile Club settled on the well-known formula $B.H.P. = 0.4D^2N$. This formula is founded on an assumed mean effective pressure of 67.2 lb. per square inch and a piston speed of 1000 feet per minute. A report was presented at the meeting of the Incorporated Institution of Automobile Engineers on February 8, drawn up by the horse-power-formula committee. A new formula is given which avoids the objections raised to that given above, viz. the assumption of values for both the mean pressure and the piston speed, and the form being such that no correction can be applied for the increase of mean pressure which takes place with increase in the diameter of the cylinders, or for the increase in piston speed which occurs with an increased stroke-bore ratio. The committee's formula is based on the results of tests on 144 actual engines, and is as follows:—

$$B.H.P. = 0.45(d + s)(d - 1.18)N,$$

where d is the bore of the cylinder in inches, s the stroke of the piston in inches, and N is the number of cylinders.

WE are informed that, owing to an alteration in the publications, papers read before the Physical Society of London in future will appear, in general, only in the Proceedings of the society, and not in the *Philosophical Magazine*. The Proceedings and other publications are now obtainable by the public from the publishers to the society, *The Electrician* Printing and Publishing Company, Ltd., 1, 2, and 3 Salisbury Court, Fleet Street, London, E.C.

THE eighteenth report of the Leicester Museum and Art Gallery Committee to the Town Council for the year ended March 31, 1910, has been received. The long-projected extension and reconstruction of the museum and art gallery buildings have now been commenced. Important additions were made to the museum during the year; in the department of Coleoptera and economic entomology, a collection of 6000 specimens of 1300 species was presented by Mr. C. B. Healdy, and 408 specimens of 356 species, chiefly from Leicestershire, were given by Mr. F. Bouskell.

OUR ASTRONOMICAL COLUMN.

NOVA LACERTÆ.—Several further notes on Nova Lacertæ appear in the *Astronomische Nachrichten*. In No. 4470 Prof. Pickering gives particulars concerning the earlier history of the star, according to the Harvard collection of photographs, and states that spectrum photographs by Mr. E. S. King showed eleven bright lines. Prof. Nijland gives the results of magnitude observations at Utrecht showing a gradual decrease in the nova's brightness from 7.40 on January 1 and 2 to 8.30 on January 16; the colour was fairly constant at 3.7, and is found to be similar to that of the long-period variables R Arietis, T Cassiopeiæ, and S Ursæ Maj. at their maxima. Photographic magnitude observations at Munich, reported by Dr. Kühl, agree with the above in showing a somewhat similar decrease over the same period.

In No. 4471 Dr. Max Wolf gives the measures of the nova's position on plates taken on January 17 and in 1904, and raises the question whether the slight difference of 0.108 in R.A. may be ascribed to proper motion.

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Mr. P. M. Ryves has communicated to us his observations of the nova's magnitude, made at Zaragoza, Spain, between January 5 and February 5. The observations were made with a 3-inch telescope, Harvard and D.M. magnitudes being taken for the comparison stars, and show a steady decrease from 7.2 to 8.6 in the observed magnitudes.

A further note concerning the spectrum of the nova, as photographed at the Meudon Observatory, is contributed by M. Idrac to the *Comptes rendus* for February 6. Three fine nights, January 28–31, permitted him to secure photographs with from one to three hours' exposure on panchromatic plates. The very broad, bright hydrogen lines are seen to be divided into two components, of which the brighter show a "shift" of 7 Angströms towards the red, while the fainter are displaced 16 Angströms towards the violet; a dark line, possibly double, occurs on the violet side of H γ . In the yellow there are three bright bands, at about λ 587.4 (probably helium, 587.6), λ 575.4, and λ 567.5, while the green shows a band, about 30 Angströms broad, having its centre near λ 500, and a bright line at λ 493.7. The band at λ 465, mentioned in the earlier communication, is shown to be multiple, having maxima at λ 462 and λ 466, with a fainter component at λ 470; the bright lines near λ 437.4 and λ 458.3 are also shown, but appear less marked than previously. Other maxima and minima mark the continuous spectrum, and are probably indicative of lines or bands beyond the separating power of the spectrograph; such maxima are well marked in the neighbourhood of λ 425 and λ 445. The presence of nebula lines in the spectrum is open to question, but the strong band near λ 500 suggests the possible presence of the chief nebula line; its great width, however, prevents any definite solution of the question; in fact, all the wave-lengths given may only be accepted as approximations.

EPIHEMERIS FOR FAYE'S COMET.—To No. 4469 of the *Astronomische Nachrichten* Dr. Ebell contributes a daily ephemeris for Faye's comet, based on the elements published in No. 187 of the Lick Observatory Bulletins, and extending to March 27. At present the object is very near to π^2 Orionis, and is calculated to be a little fainter than the thirteenth magnitude; its motion is easterly, with a slight northern trend.

STANDARD ASTROMETRY.—An important suggestion as to the publication of results obtained in accordance with the scheme of the International Astrogaphic Conference is made by Mr. W. E. Cooke in No. 4470 of the *Astronomische Nachrichten*. This scheme embodies the observation of a definite list of fundamental stars by observatories equipped to carry out such work with the greatest possible accuracy. Other stars, *étoiles de repère*, will be connected with these by careful differential observations through a third set of stars employed as "intermediate standards." Mr. Cooke's suggestion is that while the differential observations should be made with the greatest possible accuracy, the results should be published in such a manner as to show the standards upon which each catalogued position depends.

The value of the suggestion is obvious. Although the international fundamental catalogue will probably be far superior to any now existing, future improvements in the standards are inevitable, and if Mr. Cooke's plan is followed, future observers will be able to reduce the individual published observations to the improved standards.

Mr. Cooke has followed this plan in vol. iv. of the Perth Observatory Meridian Observations, 31° to 33° S. (1900), recently received, and in an appendix he gives blank columns in which the corrections, dependent upon the future improvement of the places given in the "Perth Catalogue of Standard Stars, 1905.0," can readily be inserted.

NEW SPECTROSCOPIC BINARIES.—Lick Bulletin No. 182 gives the measures of a number of stars of which the radial velocities have recently been discovered to be variable. The following were discovered on plates secured at Santiago, generally with the two-prism instrument, and are described by Mr. J. H. Moore:— λ Hydri, γ Mensæ, ξ Columbæ, h^1 and h^2 Puppis, δ Antiliæ, θ , Crucis, ξ^2 and h Centauri, and d Lupi; for h Centauri Mr. Paddock finds a period of about 16.7 days. Observations made during